Socioeconomic Impact of the Expansion of the Strategic Petroleum Reserve in Mississippi

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I. Introduction

The U.S Department of Energy (DOE) is planning to expand the Strategic Petroleum Reserve (SPR) into Mississippi. This expansion will take place in three phases: (1) facilities construction, (2) partial capacity operations, and (3) full capacity operations. There will be SPR operations at three sites in the state: (1) a storage facility in Richton, (2) a marine terminal near Pascagoula, and (3) at pipeline terminal near Liberty.

Economic Impact Estimates

Estimates of the economic impact of this new SPR expansion have been conducted by the Sacramento Regional Research Institute (SRRI). SRRI has estimated these impacts on the State of Mississippi, the Hattiesburg Region (Forrest, Lamar and Perry Counties), the Pascagoula Region (George and Jackson Counties), and the McComb Region (Amite and Pike Counties). Their findings can be summarized as follows:

- **Statewide Impacts**:
    - Phase I - 2010-14: Construction of the underground storage site and the marine and pipeline terminals will cost $306,233,000 and will create 3,805 jobs and $100,164,943 in household earnings annually;
    - Phase II – 2015-19: Partial operation of the facilities built in Phase I and continued leaching of the storage units will cost $79,000,000 a year and will support 846 jobs and $34,815,336 in household earnings;

- Phase III – 2020 onward: Full operation of all three facilities will support 443 jobs statewide and create $14,277,618 in household earnings in Mississippi.

- **Hattiesburg Impacts** (storage operations);
  - Phase I – 2010-2014: Construction of the storage facility at Richton will support 1,224 jobs and $41,495,843 in household earnings in the 3-county region;
  - Phase II – 2015-19: Partial operation on the storage unit and continued leaching of salt domes will support 579 jobs and $29,104,385 in household earnings annually;
  - Phase III – 2020 onward: Full operation of the completed storage site will support 251 jobs and $9,631,259 in household earnings annually in the region.

- **Pascagoula Impacts** (marine terminal):
  - Phase I – 2010-2014: Construction of the marine terminal will support 233 jobs and $6,519,281 in household earnings annually in this 2-county region;
  - Phase II – 2015 forward: Operation of the marine terminal involves the same number of person under both partial and full operation of the storage units. During this phase operation of the marine terminal will support 78 jobs and $2,638,399 in household earnings annually.

- **McComb Impacts** (pipeline terminal):
    - Phase I – 2010-2014: Construction of the pipeline terminal will support 196 jobs and $4,497,617 in household earnings annually in this 2-county region;
    - Phase II – 2015 forward: Operation of the pipeline terminal involves the same number of person under both partial and full operation of the storage units. During this phase operation of the pipeline terminal will support 84 jobs and $2,932,877 in household earnings annually.

Outline of Report

Our report will proceed as follows. In Section II we will estimates the impact of the SPR activities on state government revenues. Section III will be devoted to estimating these impacts on local government revenues. In Section IV, our attention turns to the impact of these new SPR activities on local government expenditures, and Section V will contain a summary and conclusions.

II. Impacts of New SPR Activities on State Government Revenues

In Section I we reviewed the economic impact reports done by SRRI. In that review we noted how much new household earnings were created in the state in each phase of development. Those annual numbers were: (1) Phase I from 2010-14 - $100,962.943, (2) Phase II from 2015-19 - $34,815,336, and Phase III from 2020 on - $14,277,618.

The Mississippi Institutions for Higher Learning (MIHL) has estimated how much each new dollar of new household earnings brings in to the Mississippi state treasury. That amount varies by income level as shown in Table 1.

Table 1
Additions to Mississippi's General Fund
Per Dollar of New Earnings Created

Annual Income Range	Percent Addition to General Fund
<$10,000	4.61%
$15,000	5.17%
$20,000	5.58%
$25,000	5.95%
$30,000	6.13%
$35,000	6.36%
$40,000	6.49%
$45,000	6.61%
$50,000	6.80%
$55,000	6.87%
$60,000+	6.99%

Source: Bob Neal, Mississippi Institutions for Higher Learning

As it turns out, we have no model to determine how the new household earnings created by the SPR activities in Mississippi will be spread across income strata. Discussions with officials with the MIHL suggest that an appropriate methodology would be to assume the monies would be spread relatively evenly so that one could use the median family income level for the state to determine the appropriate percentage to apply form Table 1. In 2007 (latest data available) the median family income level in Mississippi was $44,769[1], which suggests that the appropriate percentage to apply from Table 1 would be 6.61%. Applying this percentage to the annual new household earnings created by SPR activities, results in the additions to the Mississippi general fund as shown in the last column of Table 2.

[1] American Community Survey, U.S. Bureau of the Census.

Table 2
Additions to the Mississippi's General Fund from New SPR Activities between 2010 and 2024
(Real 2010 Dollars)

Year	New Household Earnings	Additions to General Fund
2010	$100,964,943	$6,620,903
2011	$100,964,943	$6,620,903
2012	$100,964,943	$6,620,903
2013	$100,964,943	$6,620,903
2014	$100,964,943	$6,620,903
2015	$34,815,336	$2,301,294
2016	$34,815,336	$2,301,294
2017	$34,815,336	$2,301,294
2018	$34,815,336	$2,301,294
2019	$34,815,336	$2,301,294
2020	$14,277,618	$943,751
2021	$14,277,618	$943,751
2022	$14,277,618	$943,751
2023	$14,277,618	$943,751
2024	$14,277,618	$943,751
TOTAL	**$750,289,485**	**$49,329,740**

Note the numbers along the bottom line of Table 2. According to our estimates, **over the first 15 years of SPR activities in the state, $49,329,740 will be added to the Mississippi general fund**. These should be considered "real"---not nominal---additions to the general fund since SPR expenditure estimates were not adjusted upward for inflation. An equally important number in Table 2 is the final number in column two. Note that over the first 15 years of SPR activities, over three-quarters of a billion dollars in new earnings will be created for residents of Mississippi.

III. Impacts of New SPR Activities on Local Government Revenues

We estimate the impact of SPR activities on local governments where these activities take place through a series of steps. First, we assume the primary impact on local governments will be via additional **sales tax collections**. Impacts on total property tax collections should be relatively small (an opinion shared by officials at the MIHL) so we do not attempt to measure those impacts. Secondly we use the new household earnings impacts by region as derived by SRRI as the base for estimating sales tax collections.

Thirdly, officials with MIHL indicate from their research about 55 percent of any new household earnings created in an area are spent on items or services subject to the sales tax. Fourthly, when these monies are spent in a region, the Mississippi state sales tax is levy on the purchases. This sales tax varies by type of item (food is taxed less than clothing for example). The MIHL staff has estimated that on the average the rate is six percent. Finally, once these sales taxes are assessed and remitted to the state then the state diverts back 18.5 percent of total sales taxes collected in a region to municipalities in that region.

Using these background assumptions, we will takes the SRRI estimates of new household earnings created by SPR activities in a region, and multiply that by 55 percent to estimate total new taxable sales. This figure is then multiplied by six percent to determine total state sales taxes collected on these additional sales. Finally, we will then multiply that product by 18.5 percent to arrive at an estimate of total taxes rebated to municipalities in the region. This technique is used below to estimate total sales taxes rebated to the three regions where new SPR activities will take place.

Local Sales Taxes for the Hattiesburg Region

Recall that the Hattiesburg Region (Forrest, Lamar, and Perry Counties) is where the SPR storage units will be constructed. SRRI has estimated the following impacts on annual household earnings in this region: (1) Phase I 2010-14 -$41,495,843, (2) Phase II 2015-19 - $29,104,385, and Phase III 2020 onward - $9,631,259. Table 3 contains our estimates of additional sales taxes that will accrue to local governments in this region over the first 15 years of SPR activities.

Table 3
Sales Taxes Accruing to Local Governments in the Hattiesburg Region
Due to SPR Activities
(Real 2010 Dollars)

Year	New Earnings	Taxable Spending	New Sales Taxes Created
2010	$41,495,843	$22,822,714	$253,332
2011	$41,495,843	$22,822,714	$253,332
2012	$41,495,843	$22,822,714	$253,332
2013	$41,495,843	$22,822,714	$253,332
2014	$41,495,843	$22,822,714	$253,332
2015	$29,104,385	$16,007,412	$177,682
2016	$29,104,385	$16,007,412	$177,682
2017	$29,104,385	$16,007,412	$177,682
2018	$29,104,385	$16,007,412	$177,682
2019	$29,104,385	$16,007,412	$177,682
2020	$9,631,259	$5,297,192	$58,799
2021	$9,631,259	$5,297,192	$58,799
2022	$9,631,259	$5,297,192	$58,799
2023	$9,631,259	$5,297,192	$58,799
2024	$9,631,259	$5,297,192	$58,799
TOTAL	**$401,157,435**	**$220,636,590**	**$2,449,065**

The data in Table 3 confirm the sizeable impacts that SPR activities will have on local government revenues in the Hattiesburg Region. **Our estimates suggest that municipalities in this 3-county region will collect nearly $2.5 million in additional sales taxes over the first 15 years of SPR activity**. Again, these should be considered real (inflation adjusted) additions to local government coffers. In nominal terms, when taking into account inflation, these numbers will be even bigger. Note too the significant impact that SPR activities will have over the first 15 years on household earnings in the 3-county region---a jump of over $401 million.

Local Sales Taxes for the Pascagoula Region

A new marine terminal will be constructed and operated in the Pascagoula Region (George and Jackson Counties). Unlike the Hattiesburg Region, the Pascagoula region will see two phases, rather than three, of activities. SRRI estimated the impact on household earnings by phase in this region as follows: (1) Phase I 2010-14 - $6,519,281 and (2) Phase II 2015-2024 - $2,638,399. Table 4 contains our estimates of additional sales taxes that will accrue to local governments in this region over the first 15 years of SPR activities.

Table 4
Sales Taxes Accruing to Local Governments in the Pascagoula Region
Due to SPR Activities
(Real 2010 Dollars)

Year	New Earnings	Taxable Spending	New Sales Taxes Created
2010	$6,519,281	$3,585,605	$39,800
2011	$6,519,281	$3,585,605	$39,800
2012	$6,519,281	$3,585,605	$39,800
2013	$6,519,281	$3,585,605	$39,800
2014	$6,519,281	$3,585,605	$39,800
2015	$2,638,399	$1,451,119	$16,107
2016	$2,638,399	$1,451,119	$16,107
2017	$2,638,399	$1,451,119	$16,107
2018	$2,638,399	$1,451,119	$16,107
2019	$2,638,399	$1,451,119	$16,107
2020	$2,638,399	$1,451,119	$16,107
2021	$2,638,399	$1,451,119	$16,107
2022	$2,638,399	$1,451,119	$16,107
2023	$2,638,399	$1,451,119	$16,107
2024	$2,638,399	$1,451,119	$16,107
TOTAL	**$58,980,395**	**$32,439,215**	**$360,070**

These data in Table 4 show the impacts that SPR activities will have on local government revenues in the Pascagoula Region. **Our estimates suggest that municipalities in this 2-county region will collect $360,070 in additional sales taxes over the first 15 years of SPR activity**. Again, these should be considered real (inflation adjusted) additions to local government coffers. In nominal terms, when taking into account inflation, these numbers will be even bigger. Data in Table 4 also confirm the significant impact that SPR activities will have over the first 15 years on household earnings in the 2-county region---a jump of nearly $59 million.

Local Sales Taxes for the McComb Region

A new pipeline terminal will be built and operated in the 2-county McComb Region (Amite and Pike Counties). Like the Pascagoula Region, there will be two phases

of activities, and SRRI estimates the impacts on household earnings by phase in McComb to be as follows: (1) Phase I 2010-14 - $4,497,617, and (2) Phase II 2015-2024 - $2,932,877. Table 5 contains our estimates of additional sales taxes that will accrue to local governments in this region over the first 15 years of SPR activities.

Table 5
Sales Taxes Accruing to Local Governments in the McComb Region
Due to SPR Activities
(Real 2010 Dollars)

Year	New Earnings	Taxable Spending	New Sales Taxes Created
2010	$4,497,617	$2,473,668	$27,458
2011	$4,497,617	$2,473,668	$27,458
2012	$4,497,617	$2,473,668	$27,458
2013	$4,497,617	$2,473,668	$27,458
2014	$4,497,617	$2,473,668	$27,458
2015	$2,932,877	$1,613,082	$17,905
2016	$2,932,877	$1,613,082	$17,905
2017	$2,932,877	$1,613,082	$17,905
2018	$2,932,877	$1,613,082	$17,905
2019	$2,932,877	$1,613,082	$17,905
2020	$2,932,877	$1,613,082	$17,905
2021	$2,932,877	$1,613,082	$17,905
2022	$2,932,877	$1,613,082	$17,905
2023	$2,932,877	$1,613,082	$17,905
2024	$2,932,877	$1,613,082	$17,905
TOTAL	**$51,816,855**	**$28,499,160**	**$316,340**

Data in Table 5 reveal the impacts that SPR activities will have on local government revenues in the McComb Region. **Our estimates suggest that municipalities in this 2-county region will collect $316,340 in additional sales taxes over the first 15 years of SPR activity**. As a reminder, these should be considered real (inflation adjusted) additions to local government coffers. In nominal terms, when taking into account inflation, these numbers will be even bigger. Data in Table 5 also confirm

the significant impact that SPR activities will have over the first 15 years on household earnings in the 2-county region---an increase of nearly $52 million.

IV. Impacts of SPR Activities on Parish Government Expenditures

The data in Tables 3 through 5, in the previous section, document the non-trivial impact that the proposed new SPR activities will have on local government revenues. An appropriate question to ask is what will be the impact of these activities on local government expenditures? Our intuition is that given the size of the workforce once the facilities are operational, the impact should be very marginal. The data in Table 6 illustrate this point.

Table 6
Jobs Created by SPR Activities as Relative to Region Labor Force

Region	Labor Force [a]	Jobs Created by SPR [b]	Percent of Labor Force
Hattiesburg	72,480	251	0.4%
Pascagoula	69,160	78	0.1%
McComb	21,050	84	0.3%

[a] www.mdes.ms.gov/wps. Data are for 2007 [b] Sacramento Regional Research Institute

Whether it is the storage terminal, the marine terminal or the pipeline terminal, all three are very capital-intensive operations. While the number of permanent jobs created is a nice boost to each region, in no case does the addition to the labor force in the area exceed one-half of one percent. That would suggest that additional demands on the public school system, roads, police force, etc., would be marginal at best.

However, to test this "marginal impact" notion more rigorously we test it using a **substitute hypothesis**. What we do is go to a state that already has---and has had for several years---existing SPR operations. That is the State of Louisiana. What has been the experience in that state? Has the presence of SPR operations significantly increased the demand for local government services within parishes having SPR operations? Expanded governmental programs or services that may be necessitated as a direct result of the SPR activities include such things as:

- Widening roads or streets and the addition of turn lanes, traffic signs and signals.
- New or expanded water, sewer or other utility systems in the parish where the SPR is located.
- Additional police, fire and safety services to serve the parish where an SPR is located.

Multivariate Regression Analysis

Our approach uses an econometric model to estimate the independent effect of a SPR within a parish on the expenditure level of government agencies within that parish. This technique provides a consistent and precise method for isolating the effect of SPR activity on government agency expenditures. Multivariate regression analysis permits us to estimate the independent effect of SPR activity on government expenditures, holding constant the influence of other important determinants of government spending levels. Thus, this technique allows us to test the hypothesis that SPR activity, independent of other factors, causes government spending to be higher than it would otherwise be.

Economic theory and a fairly large empirical literature provide us with a guide for determining what independent variables should be included in the equation to be

estimated. It has been found that the population, wealth, income and tax base of a government jurisdiction are included in the regression analysis.

While measures of wealth/income and tax base are difficult to define, we use two alternative proxies for these important expenditure determinants. First, we use *Per Capita Income* and *Median Household Income* in each parish as one measure of the parish's wealth/tax base. We supplement these two measures by including a variable *Tax Base*, defined as the total assessed value (exclusive of homestead exemption) within each parish. Data on total assessed value are reported by the Louisiana Tax Commission.

Data for all 64 parishes in the state of Louisiana are employed to test whether the presence of a SPR activity in a parish has any impact on the level of government expenditures, holding constant parish population, income and tax base (or wealth). Data on total expenditures for each government agency were obtained from audited financial statements on file at the Office of the Legislative Auditor, State of Louisiana. We could not obtain expenditure data in each budget category for all parishes, however. We restricted our analysis to the major government agencies (relatively large spending units), which include the following: Tax Assessor, School Board, Sheriff's Office, Police Jury, Hospitals and Fire Departments.

Ordinary least squares (OLS) regression analysis is used to estimate an expenditure function for all parishes. The purpose of an expenditure function is to relate the observed differences in the level of parish expenditures to differences in population, per capita income levels, and wealth. Taking into account these important factors, the regression analysis can tell us whether the location of a SPR within a parish directly or indirectly impacts the level of government spending. The key question addressed is: Do

total expenditures in these government agencies within parishes with an SPR facility differ significantly from expenditures by similar government agencies in parishes without these facilities?

Multiple regression analysis involves estimating a mathematical equation that takes the following functional form:

$$ln(exp_a) = \delta + \sum \beta_i X_i + \gamma (SPR) + \varepsilon$$

where $ln(exp)$ = log of expenditures for a particular government agency (a)
X = vector of independent variables that explain the level of agency expenditures
SPR = dummy variable equal to 1 if the parish has a SPR and 0 otherwise
δ = constant term to be estimated
β = vector of regression coefficients (% effects of each variable)
γ = percentage effect on spending of a SPR
ε = random error term

Since we are interested primarily in the effect on government spending of the presence of SPR activity within a parish, our attention will focus on the estimates of the coefficient γ. The other independent variables (contained in the vector **X**) merely serve as "controls" so we do not bias the estimate of γ.

To test the possible effect that a SPR may have on parish level government spending, we pool all the budget categories and estimate the regression across government service categories. Our null hypothesis is that $\gamma = 0$, i.e. the presence of a SPR within a parish has no effect on the level of government expenditures. To the extent that a SPR located within a parish causes the cost of providing government services to rise, the estimated value of γ will be positive ($\gamma > 0$).

Tables 7a and 7b report the regression results for two alternative specifications or models. Both models control for population, income and wealth measures. Model 1

includes *Median Household Income* and *Tax Base* as proxies for income and wealth levels within each parish whereas Model 2 uses *Per Capita Income* instead of *Median Household Income*. We also introduce a variable (*Rural*) to take into account the possibility that expenditures may differ substantially between urban and rural parishes (that is, a parish without a major urban community). The U.S. Bureau of Economic Analysis within the U.S. Department of Commerce designates which counties (parishes) within a state are in a Metropolital Staistical Area (MSA). Those counties (parishes) outside of MSAs are considered "rural".

In Table 7a the dependent variable includes capital expenditures. Overall, both specifications perform very well. Note that the *Adjusted* R^2 in both models exceeds 77%. That is, these models explain over 77% of the total variation in government expenditures across parishes---a relatively high *Adjusted* R^2 for a cross section study.

Recall, the central question addressed by this analysis is whether the presence of a strategic petroleum reserve within a parish significantly affects the level of expenditures for local government agencies. Under both specifications, we find that the estimate of γ is insignificantly different from zero (|t| values are -0.24 and 0.50). **Thus, we cannot reject the null hypothesis that SPR activity within a parish has no significant influence on total expenditures by government agencies within that parish, once other factors such as population, income and wealth are taken into account.**

In Table 7b we report regression results for the same specifications above. However, since capital expenditures tend to be lumpy and can be subject to dramatic swings in magnitude, we subtract capital expenditures from budget expenditures for each government agency. While we are unsure whether including lumpy capital expenditures within a cross section analysis introduces a bias, the results in Table 7b are intended to

test for the possibility of a bias. **Our results remain unaltered by the exclusion of capital spending. The estimated values of γ are statistically insignificant**.

Collectively, our results show that the important determinants of government spending are population, income and wealth. Once these factors are taken into account, there appears to be no relationship between the level of government spending and strategic petroleum reserve activity within a parish.

In summary, the regression results do not show a link between local government spending and the activities of strategic petroleum reserves. Our statistical analyses strongly suggest that SPR activities do not cause an increase in the cost of providing government services to parish residents.

It may also reassure the readers to know that the location of the SPR in Mississippi has much in common with similar SPR locations in Louisiana. The location in Mississippi is in Perry County, one of the 3-county MSA known as the Hattiesburg MSA. However, Perry County is by far the smallest of the three counties in the MSA with only 12,001 residents comprising only 8.9 percent of the MSA's population.

Similarly, Cameron Parish (a Louisiana SPR site) has a population of only 7,705 and is the smallest parish in the 2-parish MSA of Lake Charles. Cameron Parish's population is only 4 percent of this MSA's total population. Another SPR site in Louisiana is Iberville Parish---a part of the Baton Rouge MSA. Though its population (32,847) is larger than Perry County, Iberville too is a side player in the large Baton Rouge MSA, comprising only 4.3 percent of the MSA's population.

Table 7a
Parish Regressions
Dependent Variable: Log of Total Expenditures Including Capital Expenditures

Variable	Model 1 Coefficient (|t| value)	Model 2 Coefficient (|t| value)
Strategic Petroleum Reserve	-0.0827 (-0.24)	0.1712 (0.50)
Population	5.93e-06* (2.44)	7.37e-06* (2.85)
Median Household Income	4.35e-05* (4.18)	
Per Capita Income		3.46e-05* (3.06)
Tax Base	6.50 e-11 (0.19)	-1.81e-10 (-0.49)
Rural	-0.2938** (-1.85)	-0.4370* (-2.87)
Intercept	16.17 (38.18)	16.77 (44.82)
Adjusted R^2	0.7754	0.7768
F-value	118.69	115.17
Number of Observations	342	342

Note: Budget category dummy variables included in regression but not reported.
* Significant at .05.
** Significant at .10.

Table 7b
Parish Regressions
Dependent Variable: Log of Total Expenditures w/o Capital Expenditures

Variable	Model 1 Coefficient (|t| value)	Model 2 Coefficient (|t| value)
Strategic Petroleum Reserve	-0.1433 (-0.42)	0.0967 (0.28)
Population	5.74e-06* (2.37)	7.06e-06* (2.74)
Median Household Income	4.13e-05* (3.98)	
Per Capita Income		3.20e-05* (2.85)
Tax Base	1.19 e-10 (0.35)	-1.04e-10 (-0.28)
Rural	-0.2801** (-1.77)	-0.4196* (-2.77)
Intercept	16.18 (38.35)	16.77 (45.02)
Adjusted R^2	0.7823	0.7774
F-value	123.55	120.06
Number of Observations	342	342

Note: Budget category dummy variables included in regression but not reported.
* Significant at .05.
** Significant at .10.